Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of:	)	
	)	
Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems	)	ET Docket No. 98-153
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	)	

Reply Comments of Preco Electronics, Inc.

Filed by: Preco Electronics, Inc.
415 N. Maple Grove
Boise, ID 83704
(208) 323-1000

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Preco Electronics, Inc. respectively submits the following reply comments in support of the "Petition For Reconsideration" submitted by Multispectral Solutions, Inc (MSSI) and received into the ECFS on June 18, 2002, as well as MSSI's "Petition For Reconsideration (Reply Comments)" received into the ECFS on July 29, 2002.

For over 50 years Preco Electronics has offered a wide variety of safety products targeted towards the commercial vehicle industry. One of Preco's newer products is a line of low-powered, short-range, object-detection radar systems capable of detecting both stationary and moving objects. These radars are simple pulsed carrier, and as a result Preco has had ample experience with Part 15 compliance testing in regards to pulsed emissions.

Pulse Desensitization Correction

The FCC's shifting interpretation of §15.35, so clearly described in MSSI's discussion of pulse desensitization correction (PDC), is particularly relevant to Preco's radar products and has had a profound effect on the ability of Preco to both demonstrate compliance and to retain the capability of building a usefully functional device. Not only has the FCC recently decided to require application of full-bandwidth

PDC calculations at the fundamental emission (well above 1 GHz), but now also at the band edges (i.e., §15.245, §15.249, etc.), and at all harmonics of the fundamental emission. Full bandwidth PDC at band edges and harmonics constrains pulse spectral emission operation to be well below the otherwise clearly stated Part 15 peak and average power limits and results in costly unnecessary filtering and performance reduction via unnecessary power reduction in the fundamental lobe.

The changes in the FCC's interpretation of §15.35 have progressed as the FCC has decided rely more and more upon the theoretical concepts developed in the well known 1971 Hewlett Packard Application Note 150-2 (see MSSI's Reply Comments for footnote reference and related comments). At first glance, this may seem like a good thing since the application note does an excellent job of describing how to accurately make pulse spectral measurements using a spectrum analyzer. This is obviously crucial to accurately evaluating pulsed device emissions. Unfortunately, the FCC carried it too far by adopting the full bandwidth peak power concepts described in the application note to be used as the method of "measuring" the pulse peak power emission levels (this cannot actually be directly measured with any standard spectrum analyzer for most pulsed operation above 1GHz, only calculated). The FCC then declares that this calculated value for theoretical peak power is the emission level which must meet the peak power limits stated in Part 15 – at the fundamental, at the band edges, and at all harmonics.

MSSI beautifully and succinctly summarized why blanket PDC above 1 GHz is unreasonable with the following text found in their "Petition for Reconsideration (Reply Comments)" :

> "From an interference perspective, however, full bandwidth peak power is irrelevant, as it is only the energy (power) received within the victim receiver's bandwidth that causes interference."

It is the victim receiver's bandwidth that defines the interference potential. Put in other words, it is the emission power spectral density that needs to be measured and controlled to rationally protect against unintentional interference. MSSI clearly demonstrates that §15.35 was already doing this prior to the recent requirement for PDC above 1 GHz.

From HP Application Note 150-2, we know that a victim receiver bandwidth must be about equal to or greater than ½ of the fundamental main lobe bandwidth in order to "see" the pulse peak power (a transient lasting the length of the pulse and repeating at the pulse repetition frequency). Otherwise, the

victim receiver will receive only a portion of the pulse spectral lines. The portion of pulse spectrum received is obviously proportional to the victim receiver bandwidth. This is why an ordinary spectrum analyzer cannot directly measure a pulse's peak transient power for many devices utilizing pulsed carrier operation above 1 GHz. This is why HP Application Note 150-2 was written and targeted towards radar designers to help them understand how to use a spectrum analyzer to characterize their radar pulses. A radar pulse must be in the nanoseconds time domain to provide reasonable range resolution. A 100 nanosecond pulse covers approximately 100 feet in space and has a main lobe bandwidth of 20 MHz. Most ordinary spectrum analyzers top out at about 3 MHz, and most radar pulses are considerably shorter than 100 nanoseconds.

Ordinarily, a receiver's bandwidth is made a small as is practically possible in order to both exclude undesired signals and to reduce the thermal noise floor, which is of course directly proportional to the receiver's bandwidth. A very sensitive receiver will by necessity have a very narrow bandwidth, and will be capable of receiving only one or a very small number of potentially interfering pulse spectral components. The limits set forth in Part 15 already adequately protect these sensitive receivers by measuring peak power spectral density in a minimum 1 MHz bandwidth. These receivers cannot ever experience even a fraction of the full bandwidth transient pulse peak power. The more wideband the pulsed emission spectrum, the lower the power of the few individual spectral components which might be received in a sensitive victim receiver.

Preco Electronics welcomes the FCC's direction to use HP Application Note 150-2 as a basis for making accurate spectral measurements of the pulse spectral components. These components are CW in time as long as the pulse is active and are therefore equal in peak and average value individually. However, Preco **strongly** agrees with MSSI that the full bandwidth theoretical peak power calculation has no relevancy, and that the original intent of §15.35 very adequately accounts for emissions above 1 GHz by requiring measurement using a peak detector with a bandwidth of 1 MHz or greater. This measurements provide a normalized peak power spectral density that is unbiased, has a long history of proven adequacy, and provides an accurate indication of interference potential that is easily understood.

Vehicular Radar Restriction

Preco Electronics also very strongly agrees with MSSI's position and comments in regards to the arbitrary restriction of mobile UWB devices in the 3.1 GHz to 10.6 GHz band. In their Petition for Reconsideration, MSSI makes the following statement:

> "Thus it makes little sense for the FCC to restrict operation of low PRF devices, e.g. vehicular radars, in the same region of the spectra (e.g., 3.1 to 10.6 GHz) that it is considering for the use of high-speed communications devices which have been shown to have a significantly higher potential for interference."

As long as the FCC resolves the conflict between the allowed UWB emission levels and the standard Part 15 emission levels by removing the requirement for PDC, and the requirements for reduced emission levels below 3.1 GHz are met, then there is no potential for a higher interference probability in a mobile UWB device than in any other allowed mobile Part 15 device.

This ruling is needlessly restricting innovation by requiring mobile UWB devices to operate in a region of spectrum where component costs are much higher and technical complications further increase cost and development time.

Respectfully submitted,

Brian Bandhauer

Senior RF Engineer
Preco Electronics, Inc.